

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

ORIGINAL

In the Matter of)

)
Rulemaking to Amend Parts 1, 2, 21, and 25 of the)
Commission's Rules to Redesignate the)
27.5-29.5 GHz Frequency Band, to Reallocate)
the 29.5-30.0 GHz Frequency Band, to Establish)
Rules and Policies for Local Multipoint Distribution)
Service and for Fixed Satellite Services)

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CC Docket No. 92-297

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To: The Commission

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF SECRETARY

**CONSOLIDATED COMMENTS OF
LOCKHEED MARTIN CORPORATION**

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To: The Commission

**CONSOLIDATED COMMENTS OF
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Lockheed Martin Corporation ("Lockheed Martin"), by its attorneys, hereby submits its comments to address the Petitions for Partial Reconsideration of the *First Report and Order*^{1/} in the above-captioned proceeding filed by TRW Inc. ("TRW")^{2/} and Motorola Satellite Communications, Inc. ("Motorola").^{3/}

^{1/} *Rulemaking to Amend Parts 1, 2, 21, and 25 of the Commission's Rules to Redesignate the 27.5-29.5 GHz Frequency Band, to Reallocate the 29.5-30.0 GHz Frequency Band, to Establish Rules and Policies for Local Multipoint Distribution Service and for Fixed Satellite Services*, FCC 96-311 (rel. July 22, 1996), 61 Fed. Reg. 44177 (Aug. 28, 1996) ("*First Report and Order*").

^{2/} *Petition of TRW Inc. for Clarification and/or Partial Reconsideration of the First Report and Order*, CC Docket No. 92-297, filed Sept. 24, 1996 ("TRW Petition").

^{3/} *Petition for Partial Reconsideration of Motorola Satellite Communications, Inc.*, CC Docket No. 92-297, filed Sept. 27, 1996 ("Motorola Petition").

I. INTRODUCTION

The *First Report and Order* is the culmination of years of intense effort on the part of the Commission and interested parties to develop a 28 GHz band plan that is technically acceptable and fair to all concerned. Over the protracted period of the 28 GHz rulemaking, Lockheed Martin pressed for compromise solutions in order to reach a mutually-agreeable and technically sound spectrum sharing arrangement. Lockheed Martin believes that fundamentally this objective has been achieved, although certain elements of the *First Report and Order* could be modified.

Lockheed Martin agrees with TRW that minor aspects of the Commission's proposed rules should be modified slightly to reflect more accurately the understanding of the parties involved in the proceeding. However, certain portions of the Motorola Petition appear to challenge basic elements of the 28 GHz band plan which were agreed to by the parties and accepted by the Commission. As discussed below, Lockheed Martin cannot support any request which would fundamentally alter the delicate balance achieved in the 28 GHz proceeding.

II. COMMENTS REGARDING THE TRW PETITION

TRW suggests that portions of proposed Section 25.258 of the Commission's rules do not accurately reflect the understanding of TRW and the GSO FSS applicants which seek to use the bands 29.25-29.5 GHz on a co-primary basis for uplink operations. Specifically, TRW requests that the Commission: (i) amend Section 25.258(b) to indicate that GSO FSS systems operating in the vicinity of NGSO MSS feeder link earth stations should select frequency and polarization schemes "to minimize instances of unacceptable interference to TRW's NGSO MSS space

stations;^{4/} and (ii) amend Section 25.258(d) to indicate that *additional* NGSO MSS systems applying to use the 29.25-29.5 GHz band for feeder link operations must demonstrate that their system can share with GSO FSS *and* NGSO MSS systems operating in the band.^{5/}

As discussed below, Lockheed Martin believes that although Section 25.258(b) may not accurately reflect the understanding of the parties involved in the 28 GHz proceeding, TRW's suggested modification of that section also misses the mark. However, Lockheed Martin generally supports TRW's proposed revision of Section 25.258(d).

A. Section 25.258(b) Should Be Modified to Accurately Reflect the Understanding of the Parties Involved in the 28 GHz Proceeding.

Although Lockheed Martin agrees that Section 25.258(b) should be modified to accurately reflect the understanding of the parties involved in the 28 GHz proceeding, TRW's proposed revision does not fully achieve that objective. The purpose of careful frequency/polarization selection in the vicinity of NGSO MSS feeder link earth stations is to minimize uplink interference into *both* GSO FSS and NGSO MSS systems. Accordingly, Lockheed Martin urges the Commission to modify Section 25.258(b) to reflect that GSO FSS frequencies and polarization should be selected to protect both GSO FSS and NGSO MSS space stations. Additionally, Lockheed Martin proposes that the Commission modify Section 25.258(b) to specifically include another alternative — geographic separation to provide uplink beam isolation — as a recognized means of minimizing unacceptable interference. Considering these proposed changes, Section 25.258(b) should read as follows:

^{4/} TRW Petition at 3 (emphasis in original).

^{5/} *Id.* at 3-4.

~~Licensed~~^{6/} GSO FSS systems shall, to the maximum extent possible, operate with frequency/polarization selections, in the vicinity of operational or planned NGSO/MSS feeder link earth station complexes, or alternatively GSO FSS and NGSO MSS systems shall operate with geographic separation to provide uplink beam isolation, that will minimize instances of unacceptable interference to the GSO FSS and NGSO MSS space stations.

These proposals are addressed in turn.

1. Section 25.258(b) Should Be Modified to Reflect that Frequency/Polarization Selection Should Minimize Unacceptable Interference into Both GSO FSS and NGSO MSS Systems.

TRW requests that the Commission modify Section 25.258(b) to reflect that GSO FSS systems must select frequency and polarization schemes to minimize instances of harmful interference into NGSO MSS systems. However, the true objective of careful frequency and polarization selection in the vicinity of NGSO MSS feeder link earth stations is to minimize unacceptable uplink interference into GSO FSS *and* NGSO MSS space stations from transmitting earth stations employed by the other service. Accordingly, Section 25.258(b) should provide that GSO FSS system shall, to the maximum extent possible, operate with frequency/polarization selections, in the vicinity of operational or planned NGSO MSS feeder link earth station complexes, or alternatively GSO FSS and NGSO MSS systems shall operate

^{6/} The inclusion of the term "licensed" appears to be unnecessary because only licensed GSO FSS systems may operate as contemplated by the rule. Moreover, the use of this term may give the mistaken impression that licensed NGSO MSS systems need not coordinate with GSO FSS systems in this band until GSO FSS authorizations have actually been issued by the Commission. In light of the complexity and importance of sharing issues in the 28 GHz band, the Commission should foster such coordination efforts at the earliest possible time by deleting any language which could be interpreted to allow licensed systems to decline to coordinate with existing GSO FSS applicants.

with geographic separation to provide uplink beam isolations, that will "minimize instances of unacceptable interference to the GSO FSS and NGSO MSS space stations."

This change to Section 25.258(b) effectively addresses TRW's concern that GSO FSS frequency/polarization selections should be made to minimize unacceptable interference to NGSO MSS space stations. At the same time, the modified rule recognizes that minimizing unacceptable interference to GSO FSS space stations from NGSO MSS feeder link earth stations is also a fundamental purpose underlying this rule.

2. Section 25.258(b) Should Be Modified to Reflect that Geographic Separation May Be Used to Minimize Unacceptable Interference into GSO FSS and NGSO MSS Systems.

The technique of selecting frequency and polarization schemes for GSO FSS systems operating in the vicinity of NGSO MSS feeder link earth stations to minimize instances of unacceptable interference is generally applicable to GSO FSS systems which plan to employ full beam coverage in the 29.25-29.5 GHz band (*e.g.*, through the use of multiple spot beams). However, Lockheed Martin's Astrolink^{TM/SM} system currently plans to operate only a limited number of spot beams in this band, each directed towards a single gateway earth station or a small number of gateway earth stations within the beams' coverage. In view of the small number of Astrolink^{TM/SM} gateway beams and Odyssey'sTM plan to operate only two feeder link earth stations in the United States, geographic separation is a viable means for minimizing unacceptable interference.

Locating Astrolink^{TM/SM} gateways geographically apart from OdysseyTM feeder link earth stations provides uplink beam isolation and achieves the same goal of minimizing instances of unacceptable interference into both the GSO FSS and NGSO MSS space stations. Geographic

separation also will enable the Astrolink^{TM/SM} gateways to utilize the full 29.25-29.5 GHz band in both polarizations without causing or experiencing any interference problem with respect to the OdysseyTM system. Indeed, geographic separation is an interference mitigation technique to which TRW has already agreed in principle.

Accordingly, Lockheed Martin proposes the following additional modification of Section 25.258(b):

~~Licensed~~ GSO FSS systems shall, to the maximum extent possible, operate with frequency/polarization selections, in the vicinity of operational or planned NGSO/MSS feeder link earth station complexes, or alternatively GSO FSS and NGSO MSS systems shall operate with geographic separation to provide uplink beam isolation, that will minimize instances of unacceptable interference to the GSO FSS and NGSO MSS space stations

This proposed revision recognizes that as a result of the small number of OdysseyTM feeder link earth stations, geographic separation to provide uplink beam isolation offers a viable means for GSO FSS and NGSO MSS systems to minimize uplink interference. Of course, where geographic separation cannot achieve the goal of minimizing interference to GSO FSS and NGSO MSS space stations, careful frequency and polarization selection may still be used to achieve this goal.

B. Section 25.258(d) Should Also Accurately Reflect the Understanding of the Parties Involved in the 28 GHz Proceeding.

With respect to proposed Section 25.258(d) of the Commission's rules, Lockheed Martin believes that TRW's proposed revision of this section accurately reflects the understanding of the parties with respect to sharing by *additional* NGSO MSS systems with GSO FSS *and NGSO MSS* systems operating in the 29.25-29.5 GHz band. Lockheed Martin agrees that Section

25.258(d) should not apply to Odyssey™ and that the coordination obligation of new NGSO MSS entrants should extend to GSO FSS systems and to Odyssey™. As Lockheed Martin shares TRW's understanding of Section 25.258(d)'s coordination requirement, Lockheed Martin generally supports TRW's proposed revision of that section.^{7/}

III. COMMENTS REGARDING THE MOTOROLA PETITION

Lockheed Martin offers the following comments with respect to two issues raised in the Motorola Petition. First, Motorola urges the Commission to reconsider the *First Report and Order* to the extent that it precludes IRIDIUM® feeder link operations in the 29.25-29.5 GHz band. Contrary to Motorola's assertions, the *First Report and Order* creates no "mistaken impression" regarding this issue,^{8/} for it accurately reflects the understanding of the Commission and the parties concerning Motorola's admitted inability to share spectrum in the 29.25-29.5 GHz band and Motorola's willingness to limit feeder link operations to the 29.1-29.25 GHz band. Accordingly, Lockheed Martin cannot support Motorola's request to alter this fundamental aspect of the 28 GHz band plan.

Second, Motorola asks the Commission to reconsider its decision by establishing an unwarranted coordination priority between GSO FSS and NGSO MSS systems in the 29.25-29.5 GHz band. In the *First Report and Order*, the Commission appropriately rejected coordination

^{7/} In addition, however, Lockheed Martin requests that the Commission delete the term "authorized" from Section 25.258(d). As discussed in the preceding footnote, not only is this term unnecessary, but the use of such a term with respect to GSO FSS systems may act as an unintended deterrent to the initiation of coordination efforts at the earliest possible time.

^{8/} Motorola Petition at 9.

on a "first-come-first-served" basis as unnecessary in light of the sharing principles agreed to by NGSO MSS and GSO FSS operators. Furthermore, as NGSO MSS systems will likely be deployed earlier than GSO FSS systems, the Commission plainly recognized that coordination on a first-come-first-served basis would relegate GSO FSS systems to *de facto* secondary status even though GSO FSS is allocated on a co-primary basis with NGSO MSS feeder links in the 29.25-29.5 GHz band. Finally, Lockheed Martin believes that the Commission need not entertain the request because Motorola is not authorized to operate IRIDIUM® feeder links in the bands 29.25-29.5 GHz. Thus, Lockheed Martin urges the Commission to reaffirm its decision to afford co-equal coordination status between GSO FSS and NGSO MSS systems in this band.

A. Limiting IRIDIUM® Feeder Link Operations to the 29.1-29.25 GHz Band Reflects its Inability to Share With GSO FSS in the 29.25-29.5 GHz Band and the Understanding of the Parties.

On July 28, 1995, the Commission published its proposed band plan which indicated that NGSO MSS feeder link systems would be required to share the 29.1-29.25 GHz band with LMDS and the 29.25-29.5 GHz band with GSO FSS applicants.^{9/} For nearly a year thereafter, the Commission and interested parties worked intensely to resolve the significant and complex sharing issues which arose between NGSO MSS feeder links and LMDS and GSO FSS systems. As explained below, the *First Report and Order* represents the resolution of these difficult sharing issues.

^{9/} See *In the Matter of Rulemaking to Amend Parts 1, 2, 21, and 25 of the Commission's Rules to Redesignate the 27.5-29.5 GHz Frequency Band, to Reallocate the 29.5-30.0 GHz Frequency Band, to Establish Rules and Policies for Local Multipoint Distribution Service and for Fixed Satellite Services and Suite 12 Group Petition for Pioneer's Preference*, CC Docket No. 92-297, 11 F.C.C. Rcd. 52 (1995).

Motorola's request to be allowed to operate in the 29.25-29.5 GHz band, in addition to its use of the 29.1-29.25 GHz band, is entirely unexpected in view of Motorola's previous support for the feeder link sharing arrangements agreed to during the 28 GHz proceeding. A grant of Motorola's request would undermine a fundamental component of the 28 GHz band plan and would have a severe, negative impact on Astrolink^{TM/SM} gateway operations and GSO FSS operations generally. Accordingly, the Commission should deny Motorola's request to open the 29.25-29.5 GHz band for IRIDIUM[®] feeder links for the following reasons.

First, Motorola has consistently maintained that it cannot share feeder link spectrum with GSO FSS operations generally, and that it cannot share spectrum even with GSO FSS gateways if another NGSO MSS system (*i.e.*, Odyssey[™]) were to operate feeder links in the same band. Second, the large number of feeder link earth stations planned for IRIDIUM[®] would effectively preclude the operation of Astrolink^{TM/SM} gateway links over large and geographically important parts of the United States where the Astrolink^{TM/SM} system would expect to deploy gateway facilities. Third, all parties involved in the 28 GHz proceeding, including Motorola, accepted the band sharing arrangements which permit IRIDIUM[®] feeder link operations in the 29.1-29.25 GHz band only. Finally, as discussed in Section III.B below, Motorola's insistence on a "first-come-first-served" coordination policy would relegate the primary allocation of GSO FSS in the 29.25-29.5 GHz band to *de facto* secondary status.

1. The First Report and Order Reflects Motorola's Admitted Inability to Share in the 29.25-29.5 GHz Band.

During January and February 1996, several status conferences were held amongst the Commission staff and interested parties to discuss sharing issues in the various 28 GHz band segments. During meetings on January 25 and February 5, 1996, Lockheed Martin presented the results of computer simulations of interference into its Astrolink^{TM/SM} system from the feeder links of both the OdysseyTM and IRIDIUM[®] systems. These studies indicate that the interference into the Astrolink^{TM/SM} Ka-band uplink resulting from near-located earth stations was probably acceptable. However, a similar Motorola analysis of interference from a typical GSO FSS uplink indicates that unacceptable interference into NGSO MSS space stations would exist without the implementation of extensive mitigation measures.^{10/}

The interference into IRIDIUM[®] space stations from GSO FSS transmitting earth stations (such as the Astrolink^{TM/SM} gateways) is greater than interference into OdysseyTM because of the large difference in the orbit altitudes of IRIDIUM[®] and OdysseyTM space stations. As a result, each IRIDIUM[®] feeder link earth station tends to require a larger protection zone than those of OdysseyTM in order to utilize frequency/polarization selection or geographic beam separation as viable interference mitigation techniques. Furthermore, whereas OdysseyTM plans two U.S. feeder link earth stations, IRIDIUM[®] has six planned feeder link earth stations in the United States. This precludes large parts of the continental United States as potential locations for Lockheed Martin's Astrolink^{TM/SM} gateway links.

^{10/} See, e.g., *Joint Comments of Motorola Satellite Communications, Inc. and Iridium, Inc.*, CC Docket No. 92-297 (Sept. 7, 1995) at App. 2.

Motorola has consistently asserted that its feeder links cannot share with GSO FSS systems without onerous restrictions on GSO FSS operations.^{11/} For example, in its Consolidated Comments and Petition to Deny the Ka-band Applications, Motorola explained:

The absence of a restriction on the type, number and location of FSS terminals of these Ka-band systems would create a very complex environment of transmissions from omnipresent FSS interfering sources to multiple geostationary orbital locations. *Coordination of MSS feeder link operations with such transmissions would be impossible.* As explained in the Technical Appendix 1 attached hereto, successful coordination of such systems by use of mitigation techniques, including geographic separation and power control, can be achieved *only* if FSS operations in the shared spectrum are restricted to a limited number of large terminals located a substantial distance from the affected MSS feeder link locations, including, at the very least, the sites to be identified by Motorola for satellite control stations and gateways. *Such mitigation techniques simply are not compatible with the co-frequency use of FSS VSATs.*^{12/}

Moreover, Motorola has steadfastly maintained that it cannot share feeder link spectrum, even with GSO FSS gateways, if another NGSO MSS system (*i.e.*, Odyssey™) is afforded access to the same bands.^{13/} Although Motorola indicated early in this proceeding that it could share with limited Astrolink™/SM gateway operations in the 29.25-29.5 GHz band,^{14/} it subsequently

^{11/} See *e.g.*, *Joint Reply Comments of Motorola Satellite Communications, Inc. and Iridium, Inc.*, CC Docket No. 92-297, filed Oct. 10, 1995, at 14-15; see *Joint Comments of Motorola Satellite Communications, Inc. and Iridium, Inc.*, CC Docket No. 92-297, filed Sept. 7, 1995, at 11-15; see also *In the Matter of the Applications of AT&T Corporation, et al.*, ("Ka-band Applications"), *Consolidated Comments and Petitions to Deny of Motorola Satellite Communications, Inc.*, filed Dec. 15, 1995, at 2-7.

^{12/} *Consolidated Comments and Petition to Deny Ka-band Applications of Motorola Satellite Communications, Inc.*, filed Dec. 15, 1995, at 6 (emphasis added, footnotes omitted).

^{13/} See *Joint Reply Comments of Motorola Satellite Communications, Inc. and Iridium, Inc.*, CC Docket No. 92-297, filed Oct. 10, 1995, at 12-14.

^{14/} See *Consolidated Comments and Petition to Deny Ka-band Applications of Motorola Satellite Communications, Inc.*, filed Dec. 15, 1995, at 4.

argued that IRIDIUM® could not share with Astrolink™/SM gateways if TRW used the same band for its feeder link operations.^{15/} In short, Motorola specifically argued that sharing with the limited Astrolink™/SM GSO FSS gateway links — let alone GSO FSS operations generally — *would be impossible if Motorola were required to share its feeder links with another MSS provider (i.e., Odyssey™).*^{16/}

Based on Motorola's own assertions and supporting technical analyses concerning NGSO MSS feeder link/GSO FSS sharing, the Commission correctly concluded that the IRIDIUM® system could not share with GSO FSS systems in the 29.25-29.5 GHz band:

Motorola will be limited to operating its feeder links within this 150 MHz band [29.1-29.25 GHz], since Motorola indicates it will be unable to share with GSO FSS systems in the adjoining band.^{17/}

Accordingly, the Commission appropriately limited IRIDIUM® feeder link operations to the 29.1-29.25 GHz band where sharing with GSO FSS was not required.

The Commission and interested parties relied on Motorola's repeated assertions that it was unable to share with both GSO FSS and NGSO MSS to devise a fair and technically acceptable 28 GHz band plan. Motorola's last-minute request to operate IRIDIUM® feeder links in the 29.25-29.5 GHz band, in addition to its use of the 29.1-29.25 GHz band, constitutes a fundamental departure from technical assertions consistently made by Motorola throughout this proceeding. Accordingly, the Commission is left with no choice but to deny Motorola's request.

^{15/} See *Motorola's Consolidated Reply in the Matter of the Ka-band Applications*, filed Feb. 7, 1996, at 12 n.27.

^{16/} See *id.*

^{17/} *First Report and Order* at 28.

2. Allowing Both Odyssey™ and IRIDIUM® to Operate in the 29.25-29.5 GHz Would Significantly Disrupt Astrolink™/SM Gateway Operations and GSO FSS Operations Generally.

If Motorola's request to operate IRIDIUM® feeder links in the 29.25-29.5 GHz band were granted, it would have a significant negative effect on Lockheed Martin's usage of this band and could result in the band being effectively unusable for the Astrolink™/SM system. Furthermore, according to Motorola's own analyses, general GSO FSS operations would be virtually precluded if IRIDIUM® feeder links were accommodated in this band.

The Astrolink™/SM gateway links require high availability, like that of any high capacity telecommunications trunk line. Indeed, in many respects, the Astrolink™/SM gateway links are analogous to the feeder links in an MSS system. For this reason, these links cannot tolerate the significant interruption which might occur as a result of interference from NGSO MSS feeder links. However, because of the particular characteristics of TRW's Odyssey™ system, measures can be adopted that will ensure that interruption of the Astrolink™/SM gateway links is maintained within acceptable levels.

Various possible mitigation techniques have been agreed to in principle with TRW. These include using different frequencies and polarization in GSO FSS beams pointed towards Odyssey™ feeder link earth stations. In addition, because there will only be two Odyssey™ feeder link earth stations in the United States,^{18/} it is possible for the Astrolink™/SM system to avoid using any gateway beams directed towards Odyssey™ feeder link earth stations and still use the full bandwidth in both polarizations.

^{18/} The Odyssey™ system's choice of orbit leads to its requirement for only two feeder link earth station sites in the United States.

However, NGSO MSS systems such as IRIDIUM® that will operate in low earth orbit require significantly more feeder link earth stations. The large number of U.S. feeder link sites planned for IRIDIUM® effectively eliminates the possibility of geographic separation as a viable technique for sharing with the Astrolink^{TM/SM} gateways, and virtually precludes sharing with GSO FSS operations generally.

Much analysis also was performed which demonstrates that repeating ground tracks provide significant sharing advantages where the earth station locations of both the NGSO MSS and GSO FSS systems are carefully selected. These advantages can be fully exploited in the case of the OdysseyTM constellation and the Astrolink^{TM/SM} gateway links in order to minimize interference between the systems. However, low earth orbit NGSO MSS systems such as IRIDIUM® cannot maintain repeating ground tracks and do not possess this additional sharing advantage. Thus, there is a clear link between the NGSO MSS system's orbit altitude and architecture, and its ability to share feeder link spectrum with GSO FSS operations such as Astrolink^{TM/SM} gateways.

As a result of its low earth orbit architecture, sharing is much more problematic if Motorola's IRIDIUM® feeder links were permitted to operate co-frequency with Lockheed Martin's Astrolink^{TM/SM} gateway links. For example, the in-line interference with respect to IRIDIUM® is significantly worse than with OdysseyTM. As a result, geographic beam isolation would be an absolute necessity. Unfortunately, the six planned U.S. gateway sites of the IRIDIUM® system would preclude operation of Astrolink^{TM/SM} gateways over large and important parts of the United States.

Moreover, if IRIDIUM® operated in the 29.25-29.5 GHz band together with Odyssey™, the available geographic area remaining for Astrolink™/SM gateways would be severely restricted. Figure 1, an extract from a joint TRW/Motorola submission to the ITU Working Party 4A meeting in Rio de Janeiro in September 1996 which seeks additional ITU spectrum allocations for NGSO MSS feeder links,^{19/} clearly shows that the combination of Odyssey™ and IRIDIUM® feeder link protection areas consumes a substantial portion of the continental U.S. land mass and includes the most significant U.S. population centers which the Astrolink™/SM system might wish to serve:

^{19/} See ITU-R Document 4A/123-E (Sept. 19, 1996) at 10.

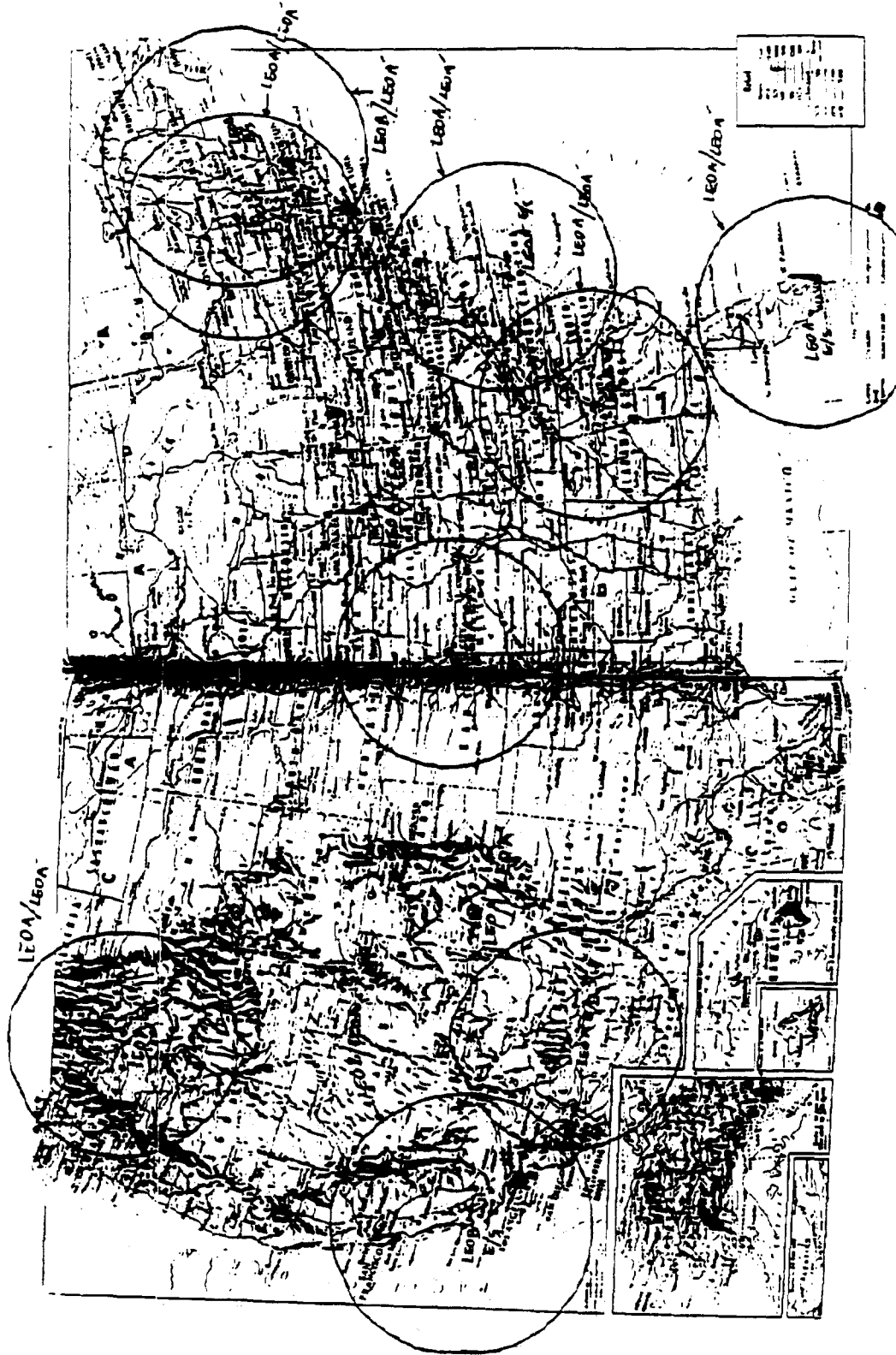


Figure 1: Required LEO A' Earth Station Separation From LEO A And LEO B Earth Stations
 (Case 1: LEO A and LEO A' Operate on Opposite Polarization)

The Commission's proposed Section 25.258(c) restricts access to the 29.25-29.5 GHz band to NGSO MSS systems that "compensate for nodal regression due to the oblate shape of the Earth, and thus maintain constant successive sub-satellite ground tracks on the surface of the Earth."^{20/} Thus, the Commission appropriately seeks to restrict the 29.25-29.5 GHz band for NGSO MSS feeder links to systems such as Odyssey™.

The Commission's 28 GHz decision is entirely consistent with the resolution of NGSO MSS feeder link sharing issues agreed to by the parties involved in the 28 GHz proceeding. It is also entirely consistent with Motorola's technical assertions that IRIDIUM® feeder links cannot share spectrum with GSO FSS and other MSS feeder links. Accordingly, limiting the 29.25-29.5 GHz band to NGSO MSS feeder links, such as those of Odyssey™, is the only technically acceptable solution to GSO FSS/NGSO MSS feeder link sharing in this band.

3. All Interested Parties Agreed to the NGSO MSS Feeder Link Sharing Arrangements Contained in the *First Report and Order*.

During the protracted negotiations following the Commission's *Third Notice of Proposed Rulemaking* in this proceeding, the Commission and interested parties worked intensely to resolve the difficult and complex issues associated with GSO FSS/NGSO MSS feeder link

^{20/} In its technical analysis Motorola points out that, if taken literally, the requirement in Section 25.258(c) to "compensate for nodal regression due to the oblate shape of the Earth" would not necessarily achieve the objective of repeating ground tracks. Therefore, Lockheed Martin suggests that the words of Section 25.258(c) be changed to read as follows:

- (c) NGSO MSS satellites operating in this frequency band shall use orbits which maintain repeating sub-satellite ground tracks on the surface of the Earth and have altitudes greater than 10,000 km.

sharing. Throughout this period, Motorola consistently maintained that IRIDIUM® feeder links could not share with GSO FSS and other MSS feeder links operating in the same band.

However, IRIDIUM® feeder links admittedly could share under certain conditions with LMDS in the 29.1-29.25 GHz band. Accordingly, the Commission and the parties involved in the 28 GHz proceeding, including Motorola, agreed that IRIDIUM® feeder links should be authorized to operate in the 29.1-29.25 GHz band (where sharing with LMDS was technically possible), but should not be permitted to operate in the 29.25-29.5 GHz band (where sharing with GSO FSS and other MSS feeder links was not technically possible).

Motorola's acceptance of the NGSO MSS feeder link sharing arrangements may be shown by reference to the record of the 28 GHz proceeding. Indeed, the Commission and the parties involved in the negotiations plainly understood that the GSO FSS/NGSO MSS sharing rules provided that GSO FSS would share only with Odyssey™ in the 29.25-29.5 GHz band. For example, Hughes recorded the general understanding of the feeder link sharing arrangements as follows:

Most important, we need to emphasize that our sharing arrangement with Odyssey is *not* applicable to Iridium. The reason is that the Iridium architecture does not include the elements described above that make this method of sharing applicable. Our proposal therefore is based on the premise that there will be no spectrum overlap between the Iridium system and the Galaxy/Spaceway System. In other words: Iridium would be limited to using 150 MHz at 29.1-29.25 GHz band for uplinks.^{21/}

^{21/} See, e.g., Letter from John P. Janka to Thomas S. Tycz (Feb. 6, 1996) at 4 (emphasis in original).

Moreover, Motorola's support for the NGSO MSS feeder link sharing arrangements was unequivocally communicated to the Commission in a joint-submission by several parties involved in the proceeding:

[T]he undersigned parties urge the Commission to promptly conclude the 28 GHz rulemaking proceeding with the adoption of the band segmentation plan it proposed by a unanimous vote in the *Third NPRM, as supplemented by the interservice sharing rules that have been agreed to subsequently*.^{22/}

Of course, the interservice sharing rules establish that IRIDIUM® feeder link operations are limited to the 29.1-29.25 GHz band.

As a result of Motorola's acceptance of the sharing arrangements, all of the parties planning to use the 29.25-29.5 GHz band — including the GSO FSS applicants and the NGSO MSS operator in this band, TRW — concluded that the unique problems associated with sharing with IRIDIUM® feeder links were not at issue because no sharing with IRIDIUM® would occur in this band. The Commission reached the same conclusion and incorporated the feeder link sharing arrangements into the *First Report and Order*.

The delicate balance struck by the Commission in the *First Report and Order* was predicated, in large measure, on the agreement of the parties involved in the proceeding with respect to GSO FSS/NGSO MSS feeder link sharing. Motorola now seeks to deviate from the terms of the sharing arrangements. However, Motorola should not now be permitted to upset a carefully balanced 28 GHz band plan, especially since fundamental aspects of the sharing arrangements were derived to reflect the characteristics of the IRIDIUM® system.

^{22/} Letter from AT&T; CellularVision, USA, Inc.; Hughes Communications Galaxy, Inc.; Teledesic Corporation; Motorola, Inc.; *et al.* to Chairman Reed E. Hundt, *et al.* (June 3, 1996) at 2 (emphasis added).

B. The Commission Should Reaffirm its Rejection of a "First-Come-First-Service" Coordination Policy.

Motorola also challenges the Commission's decision to reject a "first-come-first-served" coordination policy for the 29.25-29.5 GHz band and suggests that this decision somehow gives GSO FSS *de facto* primary status in the band. Actually, just the opposite is true. Elimination of the first-come-first-served policy preserves the co-primary allocation of GSO FSS and protects GSO FSS from being relegated to *de facto* second-class status.

Despite a co-primary allocation in the 29.25-29.5 GHz band, a first-come-first-served coordination policy would effectively grant priority to NGSO MSS over GSO FSS because NGSO MSS systems will likely be operational before GSO FSS systems. Indeed, in light of the development and licensing status of the IRIDIUM® system, granting Motorola's requests could effectively preclude the use of the band by GSO FSS systems.^{23/} The Commission's rejection of such a policy, and its placement of IRIDIUM® feeder link operations in the adjacent band only, ensure that the GSO FSS systems and the NGSO MSS system (*i.e.*, Odyssey™) which seek to use the 29.25-29.5 GHz band will coordinate on a co-primary basis pursuant to the agreed sharing principles.

Although Motorola has previously claimed that the GSO FSS applicants do not stand on equal footing with Motorola,^{24/} the Commission could not have been clearer with respect to the

^{23/} Motorola's request for a first-come-first-served coordination policy in the 29.25-29.5 GHz band is linked to its request to operate IRIDIUM® feeder links in this band, which Lockheed Martin opposes for the reasons stated herein.

^{24/} See *Motorola's Consolidated Reply to the Ka-band Applications*, filed Feb. 7, 1996, at 8-11.

co-equal coordination status of existing GSO FSS and NGSO MSS applicants in the 29.25-29.5 GHz band:

[W]e conclude that the "first-come-first served" coordination proposal is no longer necessary. Instead, we endorse the spectrum sharing principles developed by TRW and Hughes and supported by the other GSO FSS applicants, for their systems in the 29.25-29.5 GHz band.^{25/}

Of course, use of the band by other NGSO MSS systems will be subject to coordination agreements with existing GSO FSS and NGSO MSS systems.^{26/}

Given the existence of sharing principles for GSO FSS and NGSO MSS systems in the 29.25-29.5 GHz band, the Commission correctly rejected a first-come-first-served coordination framework in the *First Report and Order*. Lockheed Martin urges the Commission to reaffirm this decision. Furthermore, Motorola's request is effectively moot because Motorola is not authorized to operate IRIDIUM® feeder links in the 29.25-29.5 GHz band. Accordingly, Lockheed Martin believes that the Commission need not entertain this request.

^{25/} *First Report and Order* at 30.

^{26/} *See id.* at 31; *see also* discussion *supra* at page 6.

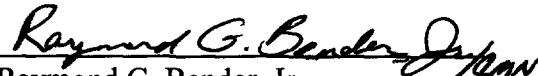
IV. CONCLUSION

For all of the foregoing reasons, Lockheed Martin urges the Commission to make the minor changes to the *First Report and Order* suggested herein, and to deny Motorola's requests which would fundamentally alter the 28 GHz band plan.

Respectfully submitted,

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DECLARATION

I am the technically qualified person contributing to the preparation of the foregoing comments of Lockheed Martin Corporation. I am familiar with the technical parameters discussed therein and declare the facts contained in the comments, except those as to which official notice may be taken, are true and correct to the best of my knowledge, information and belief.

Signed this 21st day of October 1996

A handwritten signature in dark ink, reading "Richard Barnett", is written over a horizontal line.

Richard J. Barnett
President
Telecomm Strategies